NOTE ON THE + AND — SIGNS BEFORE $\surd$, BY PROF. JOHNSON.—The question raised by Prof. Judson is one of conventional notation, viz.—shall we regard $\surd a$ as indicating sometimes the positive and sometimes the negative square root of a, or definitely the positive root. The advantage of making a distinction is unquestionable, and naturally the arithmetical root is written without sign thus $\surd 2 = 1.41+$. So also there are n nth roots of a, but there is an advantage in restricting the symbol $\sqrt[n]{a}$ to the arithmetical nth root, to the exclusion of the imaginary roots which have their own appropriate symbols. In like manner $\sin^{-1}x$ is by a useful convention restricted to that arc whose sine is x which is between $-\frac{1}{2}\pi$ and $+\frac{1}{2}\pi$; since the expressions $\pi - \sin^{-1}x$, $2\pi - \sin^{-1}x$ &c., will then express without ambiguity the other arcs of which x is the sine.

If this convention is adopted we cannot of course say that a radical equation necessarily has a root. Thus the two equations $x + \surd(ax+b) = c$ and $x - \surd(ax+b) = c$ give rise to the same quadratic, which quadratic will have two roots real or imaginary, and it may be shown of either of these roots that it must satisfy one or other of the radical equations, but in some cases both roots belong to one of the equations and no root at all to the other.

Prof. Johnson adds—"As no one has answered my paradox published in the March No., I will mention the solution of the falacy. It consists in the tacit assumption, that under the definitions, every conic has a pole. For a conic which *has* a pole, the construction in (2) is correct. Moreover every straight line has four poles, the intersections of the system of conics whose poles lie on the line. But if we pass two conics through two *given* points, it will not generally happen that these conics admit of poles, hence the line mentioned in (5) does not generally exist, and the general conclusion in (6) is founded on a non-entity."

PROBLEMS.

75. BY D. BROWN, GRAFTON, ILL.—A stick of timber of uniform density and size from end to end, has a weight of 600 pounds suspended at one end by which it is balanced horizontally on a fulcrum 6 feet from the end where the weight is suspended. If the fulcrum be 5 feet from the same end the stick will be balanced with a weight of 800 pounds. Required the weight and length of the stick.

76. BY ISAAC H. TURRELL, CUMMINSVILLE, OHIO.—Within a given circle to draw three others tangent to it and touching each other externally, the sum of whose diameters shall be equal to that of the given circle.